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Introduction

In accordance with the City Auditor's 1998-99 workplan, we performed an audit of the San Jose Police Department's Bureau of Field Operations patrol divisions' staffing and deployment practices. We conducted this audit in accordance with generally accepted government auditing standards and limited our work to those areas specified in the Scope and Methodology section of this report.

The City Auditor's Office thanks the Police Department's management and staff for their cooperation during the audit.

Background

The mission of the San Jose Police Department (SJPD) is as follows:

- Promote public safety;
- Prevent, suppress, and investigate crimes;
- Provide emergency and non-emergency services;
- Create and maintain strong community partnerships;
- Adopt a multi-disciplinary approach to solving community problems; and
- Develop and promote a diverse, professional workforce.

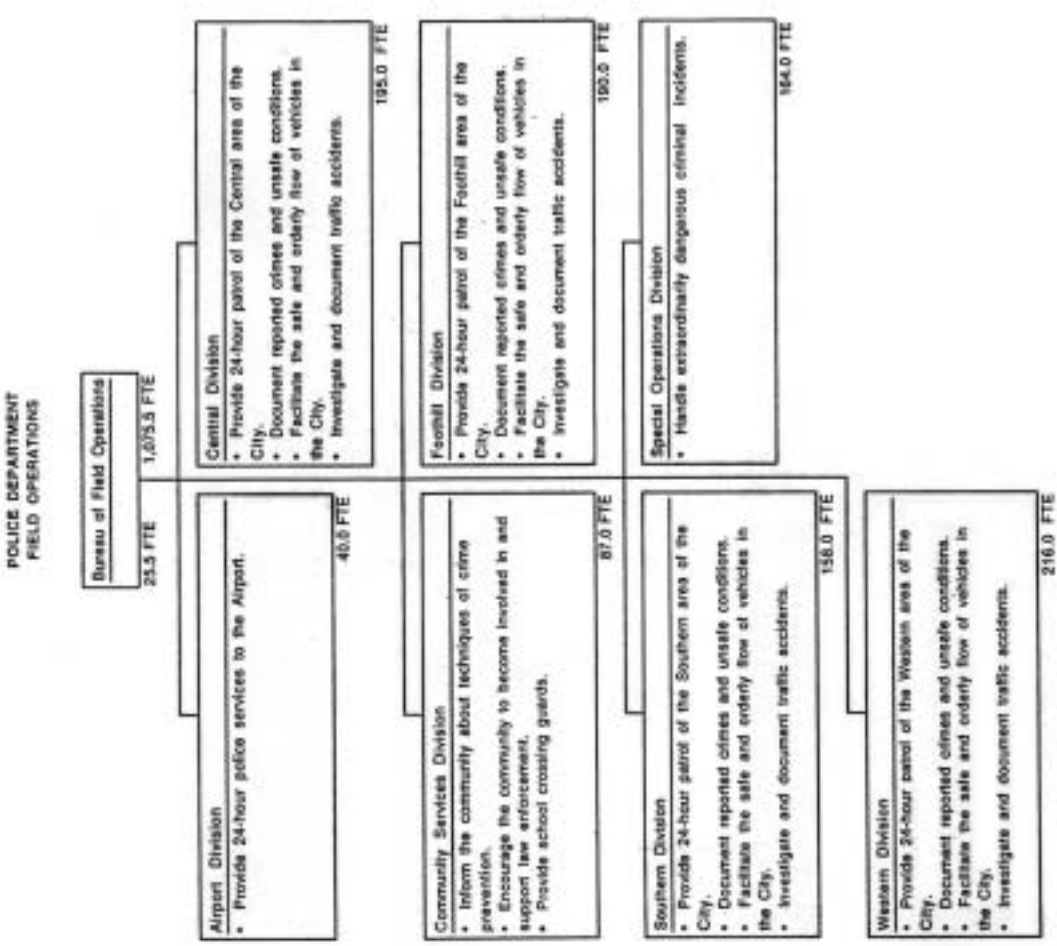
To achieve its mission, the SJPD is organized as follows:

1. Office of the Chief of Police;
2. Bureau of Administration;
3. Bureau of Technical Services;
4. Bureau of Investigations; and
5. Bureau of Field Operations.

The organization chart for the SJPD is shown on the following page.


POLICE DEPARTMENT
MAIN DIVISIONS
Office of the Chief of Police
• Provide management and administration to all bureaus and divisions within the Department.
• Maintain liaison with other criminal justice agencies to handle reporting, coordinate legislation, and seek grants.
• Provide statistical analyses and reporting as a basis for planning police services to meet departmental mission.
• Coordinate information regarding vice-oriented crimes with appropriate units.
• Maintain an internal investigative system to investigate complaints about Department employee conduct.
54.5 FTE
1,803.2 FTE
Bureau of Administration
• Process special program/fund appropriation requests.
• Maintain minimum vacancy rates of 2% or less for sworn and 11% or less for non-sworn staff.
• Administer the Disability Tracking Program and monitor the Department's Equality Assurance status.
• Provide training to Department members through in-service classes.
• Maintain integrity of police evidence and control and assign equipment; provide photographic services.
97.2 FTE
Bureau of Field Operations
• Maintain safe and effective response times to both emergency and non-emergency calls for service.
• Develop Community Policing Partnerships in neighborhoods and schools throughout the City.
• Employ proactive patrol and investigative strategies to address crime, traffic, and special policing problems.
• Present informational and educational programs to increase public safety and reduce crime.
• Insure professional development of Bureau personnel.
1,075.5 FTE
Bureau of Investigations
• Investigate reported crimes with solution potential to bring responsible offenders to justice.
• Document and collect evidence by specialized technicians in the most serious cases.
• Work with schools and community organizations to prevent, intervene and suppress narcotics and gang crimes.
• Review all DUI cases for cost recovery criteria and prepare the appropriate billings.
• Provide in-service training for all Department members, including the police academy and the Reserve Unit.
249.6 FTE
Bureau of Technical Services
• Maintain records with information pertaining to persons, stolen vehicles, stolen properties, and other areas.
• Process information on a timely basis to aid in identifying, apprehending and prosecuting suspects.
• Arrest persons and handle court dispositions in conjunction with processing warrants.
• Provide fingerprinting services.
• Provide computer aided 24-hour emergency communications services.
326.4 FTE

As the organization chart shows, the Bureau of Field Operations (BFO) is the largest bureau. The Bureau is organized into seven divisions: Community Services, Special Operations, the Airport, and four geographically based patrol divisions. The patrol divisions are Foothill, Central, Western, and Southern, and each division is comprised of four districts. The organization chart for the BFO is shown on the following page.


POLICE DEPARTMENT
FIELD OPERATIONS
Bureau of Field Operations
25.5 FTE
1,070.5 FTE
Airport Division
• Provide 24-hour police services to the Airport.
40.0 FTE
Central Division
• Provide 24-hour patrol of the Central area of the City.
• Document reported crimes and unsafe conditions.
• Facilitate the safe and orderly flow of vehicles in the City.
• Investigate and document traffic accidents.
195.0 FTE
Community Services Division
• Inform the community about techniques of crime prevention.
• Encourage the community to become involved in and support law enforcement.
• Provide school crossing guards.
87.0 FTE
Foothill Division
• Provide 24-hour patrol of the Foothill area of the City.
• Document reported crimes and unsafe conditions.
• Facilitate the safe and orderly flow of vehicles in the City.
• Investigate and document traffic accidents.
190.0 FTE
Special Operations Division
• Handle extraordinarily dangerous criminal incidents.
184.0 FTE
Southern Division
• Provide 24-hour patrol of the Southern area of the City.
• Document reported crimes and unsafe conditions.
• Facilitate the safe and orderly flow of vehicles in the City.
• Investigate and document traffic accidents.
156.0 FTE
Western Division
• Provide 24-hour patrol of the Western area of the City.
• Document reported crimes and unsafe conditions.
• Facilitate the safe and orderly flow of vehicles in the City.
• Investigate and document traffic accidents.
216.0 FTE

The four patrol divisions provide 24-hour patrol of the City's 16 districts and 83 beats. The divisions document reported crimes and unsafe conditions, facilitate the safe and orderly flow of vehicles in the City, and investigate and document traffic accidents.

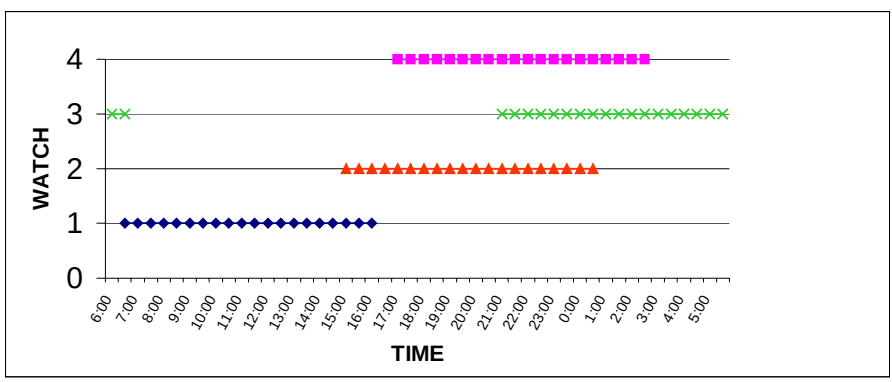
Watch Schedules

The BFO patrol officers work 4-10 hour days on one of 3½ watches[1]. Each watch schedule allows for 30 minutes at the beginning of the shift for briefing and another 30 minutes at the end of the shift to return to the station. The daily watch hours are:

- 1st Watch: 6:30 a.m. to 4:30 p.m. In addition, there is one patrol officer per district that works from 6:00 a.m. to 4:00 p.m. daily to cover the 6:00-6:30 a.m. gap that occurs in the watches. These are called the early cars;
- 2nd Watch: 3:00 p.m. to 1:00 a.m.; and
- 3rd Watch: 9:00 p.m. to 7:00 a.m.

The 4th watch runs from 5:00 p.m. to 3:00 a.m., Thursday through Sunday only and is used in only eight districts. The following graph shows the daily hours the patrol watches cover.

Graph 1 SJPD's Current Watch Daily Coverage Hours; Watch 4 Occurs Thursday Through Sunday Only



Patrol officers work one of the seven four-day/week schedules shown below.

- Sunday through Wednesday;
- Monday through Thursday;

[1] A watch is a shift worked by patrol teams and their supervisors.

- Tuesday through Friday;
- Wednesday through Saturday;
- Thursday through Sunday;
- Friday through Monday; and
- Saturday through Tuesday.

Each district has two teams working the 1st, 2nd, and 3rd Watches with the teams overlapping on one day of the week. In other words, if one team works Sunday through Wednesday and the second team works Wednesday through Saturday, then Wednesday would be the overlap day. The overlap day is used to cover officers who are absent in other districts. Therefore, the SJPD tries to stagger the overlap days to provide for adequate absence coverage.

Redistricting Project

Due to geographic and demographics changes, the SJPD initiated a project to redo the police districts[2] and beats[3]. The project, known as redistricting, was implemented in March 1999 and increased the number of police districts from 12 to 16, and increased the number of police beats from 60 to 83. By redistricting from 12 to 16 patrol districts, the SJPD expects to equalize the calls for service (CFS) workload[4]. By so doing, the SJPD expects to provide better service and response times to residents and allow for sufficient free patrol time for proactive policing (free patrol time).[5]

To achieve its redistricting goals, the SJPD developed a computer model to determine the staffing requirements and allocation of staff. The goal of the staffing model is to meet the CFS workload and provide an average of 40 percent free patrol time for officers to afford sufficient time for community policing efforts and other activities.

[2] A district is a geographical division comprised of beats. The City has 16 districts and these are denoted by letters. Four districts comprise a Division.

[3] A beat is a geographical division. Officers are assigned to beats. Several beats comprise a district.

[4] Calls For Service are calls received by the San Jose Communications Center requiring a patrol officer response. Calls For Service workload is the time allotted during a patrol officer's day to respond to calls for service and write reports.

[5] Free patrol time is time allotted during a patrol officer's day that can be used for community policing, car stops, patrolling, and similar activities. Although officers are available to respond to Calls For Service, staffing is sufficient to ensure a certain amount of this time occurs during the patrol officer's work week.

Audit Scope, Objectives, And Methodology

The purpose of this audit was to evaluate staffing and deployment practices within the patrol division of the SJPD. The objectives of the audit were to:

- Review the BFO patrol division's staffing and deployment procedures;
- Validate the Police Department's computerized staffing model's key components and assumptions; and
- Develop computerized staffing models to demonstrate if opportunities exist to deploy the division's patrol staff more efficiently.

We did not restrict ourselves to the current San Jose Police Officers' Memorandum of Agreement (MOA) with respect to certain aspects of operations, such as starting times, and the method of rotating patrol vehicles.

To perform our audit we:

- Obtained from the SJPD the CFS data from the 12 districts that were in effect in 1996 and which data the SJPD reallocated to the 16 districts that the SJPD implemented in March 1999;
- In the absence of computer documentation for a computer generated patrol management report, we manually traced and documented the elements of a major patrol officer time component called status activity;
- Reviewed the SJPD's computerized staffing model;
- Developed our own computerized simulation patrol staffing and deployment model using Excel Solver software; and
- Ran numerous iterations of our computerized model with varying assumptions.

We interviewed officials and staff of the SJPD, the Budget Office, and the Information Technology Department. We also participated in police patrol car ride-alongs. We interviewed staff from several comparable police departments, federal and state grant agencies, the consultant the City recently used to review SJPD practices, and representatives from companies that produce police staffing computerized models and software.

The documentation we reviewed included:

- Patrol officer staffing schedules;
- Staffing and workload information;
- Police internal management reports;
- Police Officers' Association Memorandum of Agreement;
- Police consultant reports; and
- Various Police Department memoranda.

We performed only limited testing to determine the accuracy and reliability of information in the various computer reports used. Such testing included observation, walk-through, and comparison of the SJPD's patrol division's internal management reports. We met with SJPD and Information Technology staff to obtain and review information regarding the accuracy and reliability of the computer-generated information. We did not review the general and specific application controls for the computer system used in compiling the various computer reports we reviewed.

Major Accomplishments Related To This Program

In Appendix B, the SJPD informs us of its major accomplishments regarding the BFO patrol divisions.

Finding I The SJPD Needs To Acquire Patrol Staffing Software To Assess The Efficiency And Effectiveness Of Its Patrol Staffing

The San Jose Police Department's (SJPD) Bureau of Field Operations (BFO) patrol division employs patrol officers to answer calls for service (CFS) and perform proactive public safety duties and community policing 24 hours a day, 365 days a year throughout the City of San Jose (City). During the course of our audit, the SJPD and the City Auditor's Office developed computerized staffing models in order to determine the number of patrol officers required for the March 1999 redistricting. Our review of the SJPD's initial computer model revealed that:

- The SJPD's initial model calculated a 546 patrol staff requirement for redistricting. However, we found that the SJPD's computer model overstated its staffing requirement by incorrectly including activities unrelated to CFS in its CFS workload; and
- The SJPD responded to our findings by revising its initial model to produce a calculated patrol staff requirement of 510 officers, 36 less than its original model calculated. However, in the interest of officer safety, the SJPD also revised the rounding technique used in its computer model. This change increased the calculated patrol staff requirement by 37 to 547 officers, of which the Budget Office allowed 546.

The City Auditor's Office prepared computerized staffing and deployment models to demonstrate if opportunities exist to deploy patrol staffing more efficiently. Although similar in many ways to the SJPD's model, the City Auditor's models are slightly different from the SJPD's model and from one another. In discussing these models, we will refer to them as Version 1 and Version 2.

While the City Auditor's computerized staffing and deployment models appear to identify patrol deployment alternatives that are empirically more efficient than the SJPD's current deployment, that may not, in fact, be the case. This conclusion is based upon data limitations, the potentially high costs of alternative deployment methods, and public and officer safety

concerns. Our analysis, however, identified several deployment issues that merit further attention and should be evaluated more fully. These issues include the use of a full afternoon 4th watch and different watch starting times. In addition, the City Auditor's Office questions the method the SJPD uses to calculate the amount of free patrol time for proactive policing. Specifically, our analysis of the different deployment methods revealed the following:

- Version 1 provides for a full 4th Watch, and appears to provide a better matching of staff to workload than the SJPD's model. Version 1's starting times are slightly at variance with the Memorandum of Agreement (MOA) between the City and the San Jose Police Officers' Association, and require seven more officers than currently budgeted at an estimated cost of $581,000 per year, as many as 12 more sergeants at an estimated cost of $1.3 million per year, and as many as 33 more vehicles at an estimated cost of $1.4 million. However, our review also noted that the SJPD could implement a full 4th watch without any additional vehicles if it used an early and late car deployment; and
- Version 2 uses a different method to calculate the free patrol time requirement. Specifically, we prepared a model calculating the 40 percent free patrol time target on total available patrol time reduced by the patrol time used for non-CFS activities such as follow-up, administrative, lunch, breaks, court, and training time. Version 2 requires 488 officers, 65 officers fewer than Version 1 and 58 fewer officers than the SJPD's budgeted staffing deployment. However, Version 2 could also require as many as 12 more sergeants. Version 2, like Version 1 provides for a full 4th watch and provides a better matching of staffing to workload. We estimate the cost implications of the basis for calculating free patrol time to be $3.6 million per year. The SJPD could use these patrol resources to redeploy officers for community policing activities, to address public and officer safety concerns, or other policing activities.

Both the City Auditor's Office and the SJPD's computerized patrol staffing and deployment models have limitations. We contacted other police departments that have purchased specialized patrol staffing computer software that have more flexibility and capabilities than either the SJPD's or the City

Auditor's model. Although these software packages can cost as much as $400,000, their benefits appear to justify the expense. Finally, a number of police departments have used Federal grant funds to procure these patrol staffing software packages.

We recommend that the City negotiate with the San Jose Police Officers' Association to modify shift-starting times to provide sufficient flexibility to deploy officers in the most efficient manner. Further, we recommend that the SJPD and the Administration use the information in this report to develop, and forward to the City Council for concurrence a strategic, multi-year, community policing-based plan and a staffing proposal for the SJPD BFO patrol division that is responsive to both officer and public safety needs and CFS demand. By so doing, the SJPD could reallocate and redeploy as much as $3.6 million per year in BFO patrol staff resources to activities such as community policing activities, public and officer safety concerns, or other policing activities. Finally, we recommend that the SJPD investigate the feasibility of using federal or state grant funds to procure patrol staffing and deployment software. If federal or state grant funds are not available, we recommend that the SJPD, through the annual budget process, develop a budget proposal to purchase the software.

The City Auditor's Review Of The SJPD's Initial Computer Model

In 1997, the SJPD developed a computer model to assist the BFO in projecting and allocating patrol staff for the March 1999 redistricting plan. The goal of the model was to minimize team size while 1) equalizing workload, 2) maintaining minimum staffing, and 3) allowing 40 percent of each patrol unit's workweek to remain free for community policing and other activities.

Our review of the SJPD's initial computer model revealed that:

- The SJPD's initial computer model calculated a 546 patrol staff requirement for redistricting. However, we found that the SJPD's computer model overstated its staffing requirements by incorrectly including activities unrelated to CFS in its CFS workload. Specifically, the CFS workload includes activities such as follow-up, administrative, lunches, breaks, court time, return to station, report writing, and training; and
- The SJPD responded to our findings by revising its initial model to produce a calculated patrol staff requirement of 510 officers, 36 less than its original

model calculated. However, in the interest of officer safety, the SJPD also revised the rounding technique used in its computer models. This change increased the calculated patrol staff requirement by 37 to 547 officers, of which the Budget Office allowed 546.

Appendix C contains a detailed description of our analysis of the SJPD's initial computer patrol staff model and the changes the SJPD made in developing its revised model.

The City Auditor's Office Prepared Computerized Staffing Models To Evaluate Opportunities To Improve The Efficiency Of Patrol Staffing And Deployment

The City Auditor's Office prepared computerized staffing models to evaluate opportunities to improve the efficiency of patrol staffing and deployment. The SJPD's patrol staffing computer model was constrained with a number of scheduling and deployment practices that are covered in the MOA between the City and the San Jose Police Officers' Association. Some of these practices do not provide for the most efficient deployment of patrol staff. For instance, the combination of team integrity, set starting times, and a set number of watches results in the SJPD having more patrol staff when workload appears to be declining and less patrol staff when workload appears to be rising.

The City Auditor's Office developed two patrol staffing and deployment models to determine if more efficient deployment alternatives were possible. However, we did not always limit ourselves to the constraints in the MOA as noted above. For instance, we analyzed a number of factors that affect the calculated patrol staffing requirement, such as analyzing the effect of adding a full 4th watch with different starting times. We also contacted other police departments to identify other patrol staffing and deployment practices.

Although similar in many ways to the SJPD's revised model, the City Auditor's computer models are slightly different from the SJPD's model and from one another. However, in order to isolate the effects of our principal differences, we intentionally retained other SJPD model assumptions with which we have some theoretical differences. For example, we used the same absence and rounding method assumptions as the SJPD. Moreover, the City Auditor's models fully cover all workload, free patrol time, and absence requirements.

When reviewing the deployment alternatives shown in the City Auditor's models, the purpose of the models and their limitations should be clearly understood. First, the City Auditor's models should not be construed as the recommended deployment methods. In our opinion, the models serve several useful purposes. For instance, the models provide a means to compare workload and staffing throughout the workweek. By doing so, the models can assist in identifying problems with the SJPD's current deployment and potential opportunities for improvement. The models can also highlight the impact that decisions such as the number of watches and the watch starting times have on deployment.

Both the City Auditor's models and the SJPD's model have significant limitations that need to be considered when discussing the various deployment alternatives. The most significant limitation with the models is that they are only forecasting tools driven primarily by quantitative data. The best overall deployment plan should be one that balances efficiency with practical considerations such as public and officer safety. Therefore, the models should be viewed as a tool for achieving the best overall deployment plan, not the definitive deployment plan. These limitations are discussed on page 37.

In discussing the City Auditor's computer models, we will refer to them as Version 1 and Version 2, respectively. The description of each of the models and their respective advantages and disadvantages are shown below.

City Auditor's Model, Version 1

The City Auditor's model, Version 1 has many of the same constraints as the SJPD's revised model. However, Version 1 has the following differences:

- A full 4th watch; and
- Different starting times.

The watch times are:

Watch 1	7:30 A.M. to 5:30 P.M.
Watch 2	4:30 P.M. to 2:30 A.M.
Watch 3	10:30 P.M. to 8:30 A.M.
Watch 4	1:30 P.M. to 11:30 P.M.

The advantage and disadvantages of Version 1 are listed and then discussed below.

Advantage of Version 1

- Provides for a full 4th watch, which appears to provide a better matching of patrol staff to CFS workload than actual deployment and the SJPD's patrol staff computer model. As a result, officer workload appears to be more equalized.

Disadvantages of Version 1

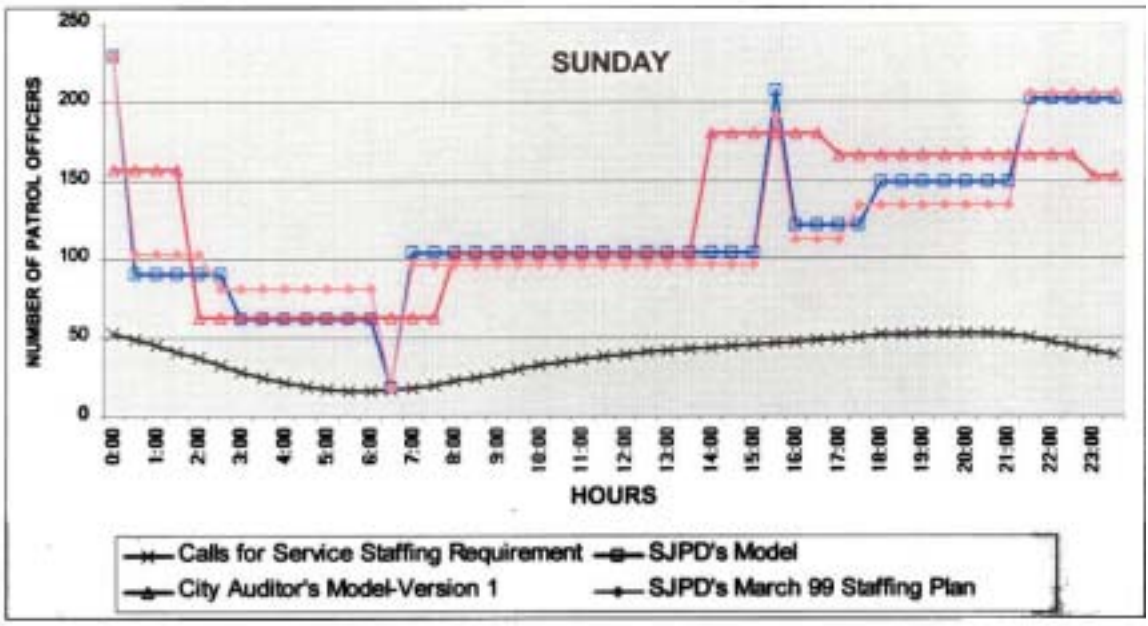
- Requires six more officers than the SJPD's model and seven more officers than currently budgeted at an estimated cost of $581,000 per year;
- Some of the starting times specified in the model are not consistent with the MOA and may not be practical;
- We estimate that as many as 12 more sergeants may be needed at an estimated cost of $1.3 million more per year than the current deployment; and
- May require as many as 33 more patrol vehicles at an estimated cost of $1.4 million.

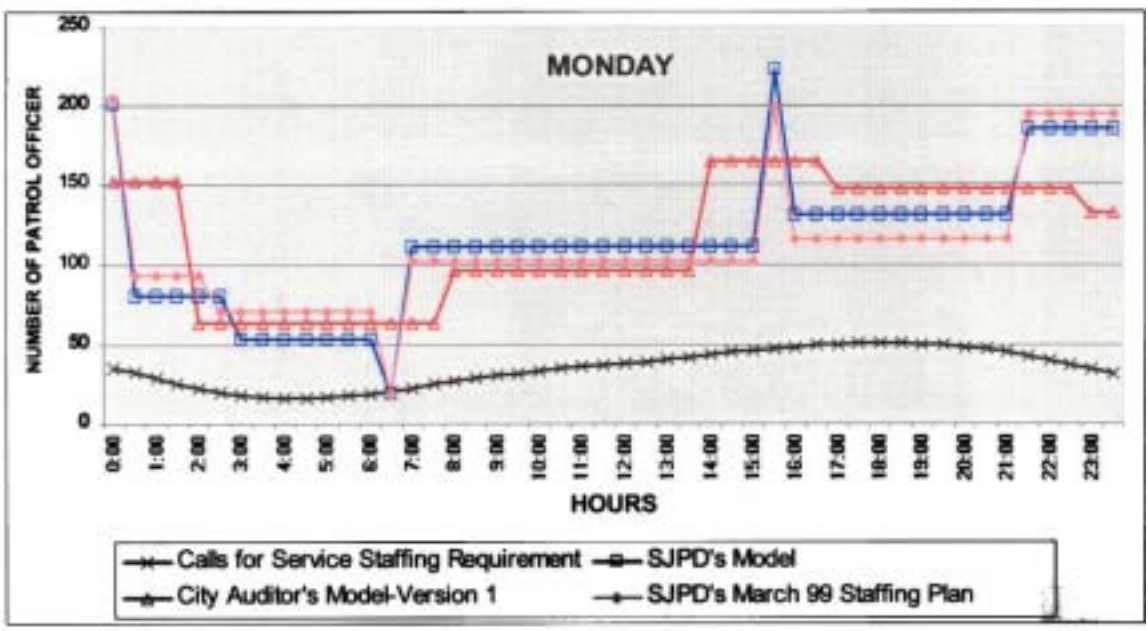
In our opinion, the primary advantage of the City Auditor's patrol staff deployment model is that it appears to provide a better matching of staff to CFS workload. Ideally, the deployment of staff should match the workload. That is, when the workload is high, more officers should be deployed. Conversely, when the workload is low, fewer officers should be deployed. This matching of staff to workload helps to equalize the workload among the officers on patrol.

The following Graphs compare the City Auditor's Version 1 calculated patrol staff requirement model to the SJPD's calculated patrol staff requirement model and March 1999 patrol staffing.

It should be noted that the SJPD's calculated and March 1999 patrol staff are not identical. This is because after BFO management reviewed the calculated patrol staffing, they made changes to increase staffing from 3:00 A.M. to 6:30 A.M. These changes resulted in increased staffing for the 3rd watch and decreased staffing for the 1st watch. Also, the SJPD did not change the 4th watch starting time to the 5:30 P.M. starting time used in the model. Instead, the SJPD elected to keep the 4th watch starting time at 5:00 P.M.

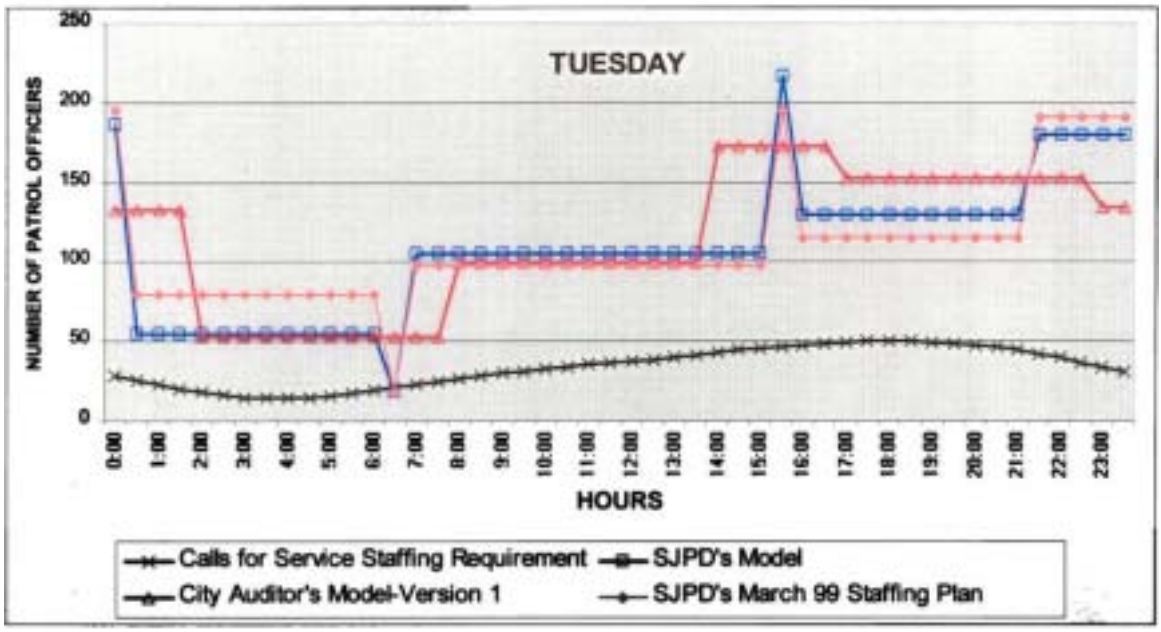
GRAPHS 2 AND 3
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 1 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN

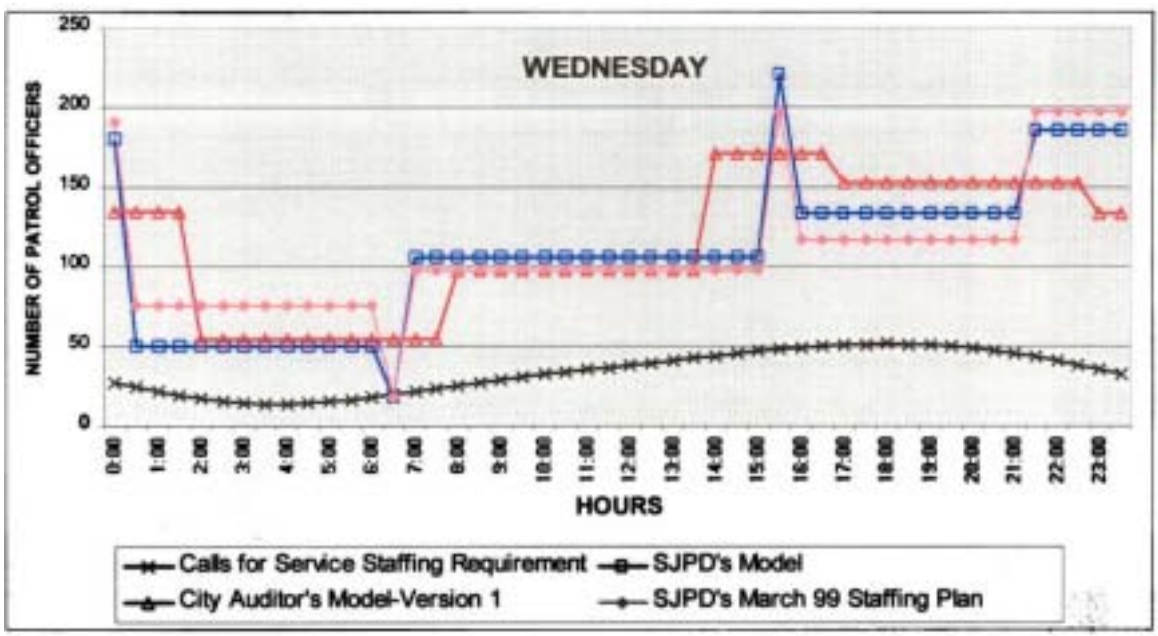




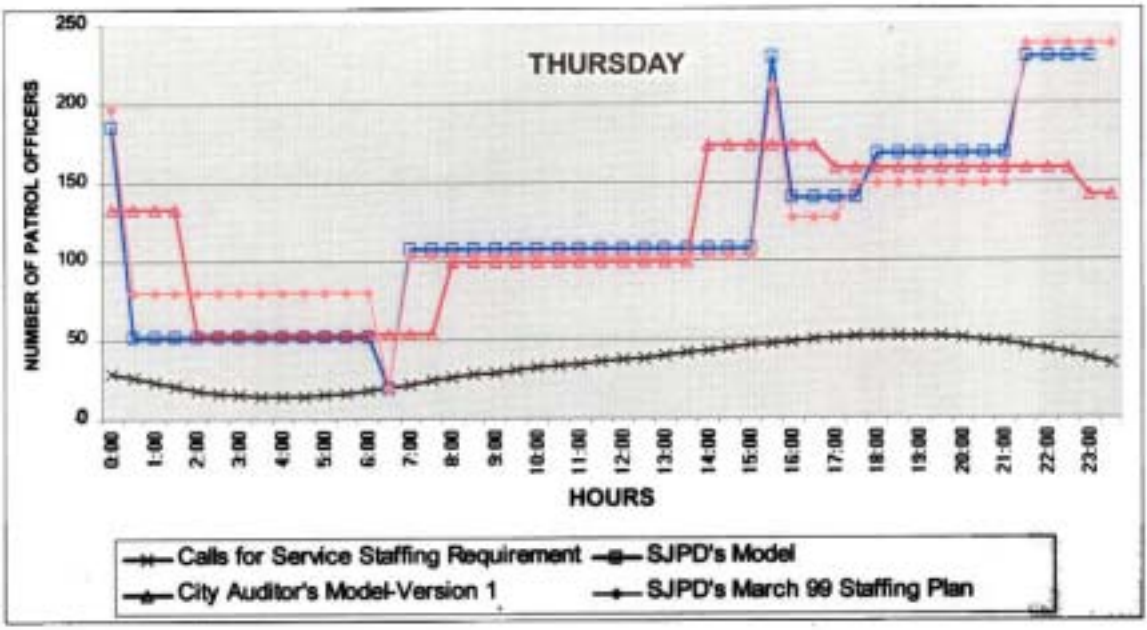
The calls for service staffing requirement is the number of officers required to handle the calls for service workload based on the average call duration of 36.03 minutes. The calls for service data is based on historical 1996 information and has been adjusted for priority levels. Each priority 1 call requires 5.16 officers, priority 2 requires 2.38 officers, priority 3 requires 1.77 officers, and priority 4 requires 1.33 officers. On average each call requires 2.18 officers.

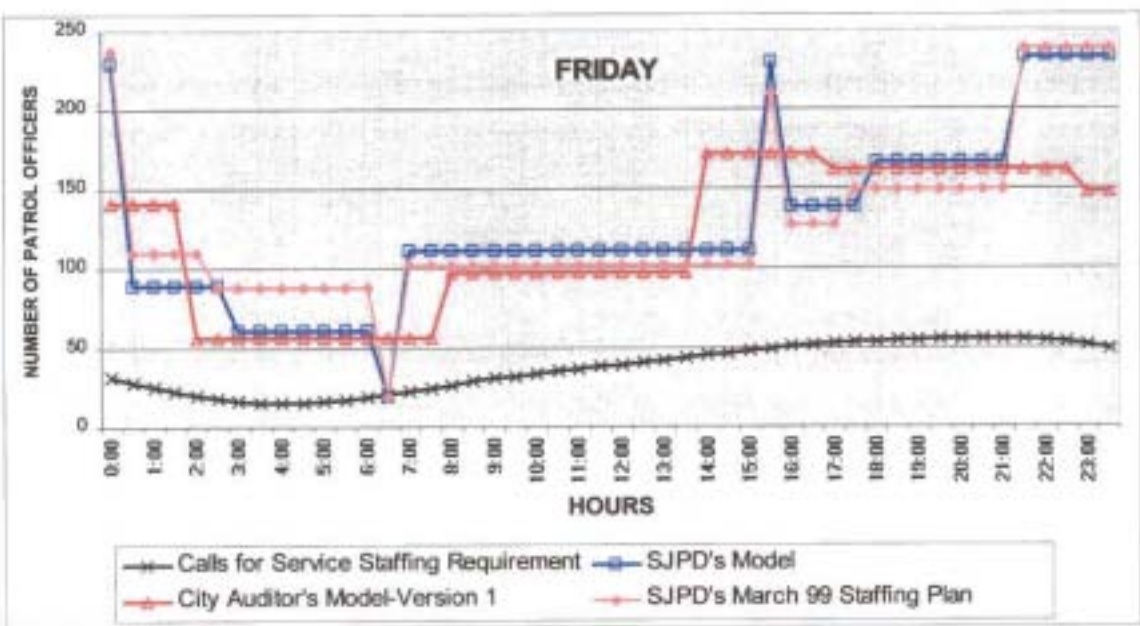
GRAPHS 4 AND 5
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 1 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)



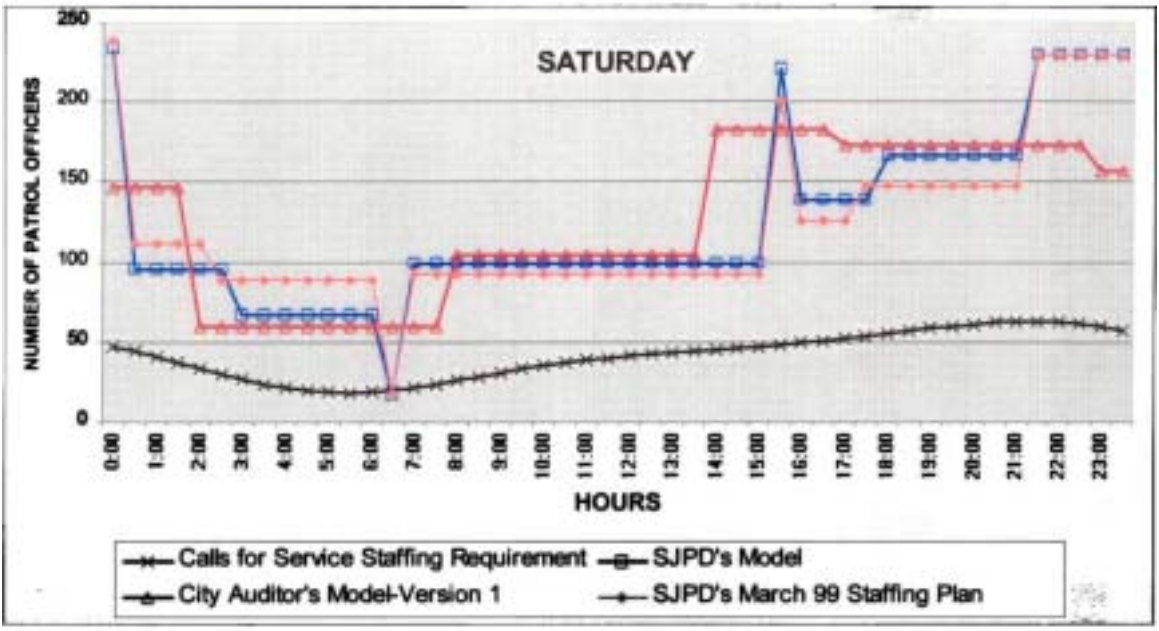


GRAPHS 6 AND 7
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 1 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)





GRAPH 8
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 1 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)



In our opinion, the Graphs highlight several SJPD deployment issues that merit further attention and should be more fully evaluated. As the graphs show, the SJPD's two deployment plans have staffing peaks from 9:30 P.M. to 12:30 A.M. *(21:30 hours to 00:30 hours)*[6] every day of the week. With the exception of Fridays and Saturdays, these staffing peaks coincide with a drop in the CFS workload.

In contrast to the SJPD's deployment, the City Auditor's model, Version 1, uses four full watches and different starting times to deploy staff. The most notable difference in the deployment plans is the City Auditor's use of a full 4th watch starting daily at 1:30 P.M. The result of this deployment plan is smaller teams spread more evenly across the day and the week.

The staffing for the full 4th watch is derived by redeploying officers from the other watches. As Exhibit 1 shows, the SJPD's 2nd watch provides the most officers – 62, to staff Version 1's 4th watch. The SJPD's 3rd watch also provides 40 officers to staff Version 1's 4th watch. See pages D-1 and D-2 in Appendix D for staffing information for Version 1 and the SJPD March 1999 staffing plan by district, watch, and day of the week.

Exhibit 1 Comparison Of Total Number Of The Officers Per Watch: SJPD's March 1999 Staffing Plan To Version 1

Daily Average Officers Per Watch	Watch 1	Watch 2	Watch 3	Watch 4	Total Watches
SJPD March 1999 Staffing Plan	173	210	141	22	546
City Auditor's Version 1	174	148	101	130	553
Increase/<Decrease>	1	<62>	<40>	108	7
% Change Inc/<Dec>	1%	<30%>	<28%>	491%	1%

The primary benefit of Version 1 is that it seemingly provides for a deployment pattern that better matches staff to CFS workload. As a result, the CFS workload appears to be more evenly distributed among the officers. As the Graphs show, the City Auditor's Version 1 redeploys the peak officers to the early afternoon hours when the CFS workload is rising. Thus, the City Auditor's Version 1 with a full 4th watch starting at 1:30 P.M. would allow the SJPD to have more patrol officers out on the street when the CFS workload is rising.

[6] Times which are in parenthesis and italicized are in military time to match graph information.

A deployment plan such as Version 1 with a full 4th watch starting in the early afternoon may also benefit the SJPD's community policing efforts. A November 1998 SJPD police management study noted that the prime time for community policing activities is Monday-Thursday from 1:00 P.M. to 9:00 P.M. because neighborhood residents, businesspersons, social service providers, and other government agency personnel are available. A deployment plan such as Version 1 could improve the SJPD's community policing efforts because it deploys more officers during prime community policing hours.

To assess how well the SJPD's model and the City Auditor's Version 1 matched CFS workloads to patrol staffing, we performed two statistical analyses - a chi-square and an *r* square. Both of the analyses calculate how well each model matches patrol staffing and CFS workloads. With the chi-square measurement, the lower the score the better the match. On the other hand, an *r* square score of 1 is a perfect match. Specifically, the results are as follows:

Exhibit 2 Comparison Of The SJPD's And City Auditor's Version 1 Models' Statistical Measurements

Statistical Measurement	SJPD's Model	City Auditor's Version 1
Chi-square	.09	.04
R Square	.52	.75

As shown above, both statistical measurements indicate that the City Auditor's Version 1 provides better matching of staff to workload than does the SJPD's model. Specifically, Version 1's chi-square measurement of .04 is much lower than the SJPD's score of .09. Similarly, the City Auditor's Version 1 *r* square score of .75 is nearly 50 percent closer to 1 than the SJPD's score of .52.

Disadvantages of Version 1

One of the disadvantages of the City Auditor's model is that Version 1 results in a staffing requirement of 553 officers, or 6 positions more than the SJPD's model and 7 more officers than currently budgeted. We estimate the cost of additional positions to be approximately $581,000 per year. Our analysis shows that the increased staffing is caused by rounding. We used the same rounding method the SJPD used. However, Version 1 with its full 4th watch requires 24 more teams than the SJPD's model. We estimate that the rounding on these

additional 24 teams resulted in a calculated 10 additional officers.

In discussing the City Auditor's Version 1 with the SJPD, the department noted several additional potential disadvantages. Specifically, the SJPD noted that some of the City Auditor's Version 1 starting times are not consistent with the MOA and some of the starting times may not be practical. Further, the full 4th watch may require additional sergeants and more patrol vehicles. These potential disadvantages are discussed below.

Starting Times Are Not Consistent With The MOA And May Not Be Practical

Exhibit 3 below shows how the City Auditor's Version 1 varies from the MOA starting time restrictions.

Exhibit 3 City Auditor's Model Version 1 Variance From MOA Starting Time Restrictions

Watch No.	Current Starting Times	Starting Times Allowed in MOA	Starting Times Version 1	Version 1 Variance from the MOA
Watch 1	6:30 A.M.	Current times +/- 30 minutes	7:30 A.M.	30 Minutes
Watch 2	3:00 P.M.	3:00 P.M. to 5:00 P.M.	4:30 P.M.	None
Watch 3	9:00 P.M.	Current times +/- 30 minutes	10:30 P.M.	60 Minutes
Watch 4	5:00 P.M.	No restrictions *	1:30 P.M.	None *

* The MOA does not specify any restrictions on the starting time of the fourth watch. However, the SJPD noted that the San Jose Police Officers' Association has indicated that it believes the Watch 4 starting time is subject to negotiation.

As shown above, the City Auditor's Version 1 starting times are slightly outside the starting times allowed in the MOA. Specifically, Watch 1 is 30 minutes outside the MOA and Watch 3 is 60 minutes outside the MOA. The starting times for both Watches 2 and 4 satisfy the requirements in the MOA.

The reason that the City Auditor's Version 1 has different starting times than allowed under the MOA is that we used *Excel Solver* linear programming software to select the optimum starting times for each watch instead of using the times specified in the MOA. Thus, although the City Auditor's Version 1 starting times are outside the MOA, the starting times selected provide optimum efficiency based on the quantitative data.

Another SJPD concern is that the starting times may not be practical for a variety of reasons. For example, the SJPD noted that Version 1, Watch 1 starting time of 7:30 A.M. is not practical because Watch 1 officers will be driving out to their beats at 8:00 A.M. instead of 7:00 A.M. According to SJPD staff, the commute traffic is significantly higher in volume at 8:00 A.M. than at 7:00 A.M. and thus the length of time driving to and from beats may be longer. Further, SJPD staff contend that because the Watch 3 officers will be returning to station at 8:30 A.M. instead of 7:00 A.M., they will be too fatigued at the end of the shift to handle the morning commute CFS.

It should be noted that the Version 1 starting times could be adjusted slightly to address some of the SJPD's concerns and still allow for a full mid-day 4th watch. For example, Richmond, California has a deployment similar to the City Auditor's Version 1 with the following starting times:

Starting Times

	Richmond, CA	City Auditor's Version 1
Watch 1	7:00 A.M. to 5:00 P.M.	7:30 A.M. to 5:30 P.M.
Watch 2	4:30 P.M. to 2:30 A.M.	4:30 P.M. to 2:30 A.M.
Watch 3	9:30 P.M. to 7:30 A.M.	10:30 P.M. to 8:30 A.M.
Watch 4	11:30 A.M. to 9:30 P.M.	1:30 P.M. to 11:30 P.M.

Richmond's starting times are within the MOA restrictions shown in Exhibit 3. However, because of time constraints, we did not run the model with Richmond's starting times.

We recommend that the SJPD and City Administration:

Recommendation #1

Negotiate with the San Jose Police Officers' Association to modify shift-starting times to provide sufficient flexibility to deploy officers in the most efficient and effective manner.

Additional Sergeants Could Be Needed

The SJPD also noted that a full 4th watch would increase the number of sergeants needed to supervise the patrol officers. According to a SJPD lieutenant, the SJPD seeks to maintain a span of control of one sergeant for every 4-9 patrol officers. In addition, according to SJPD staff, to ensure consistent supervision, the SJPD seeks to have patrol officers on the same team accountable to one sergeant. This desired span of control and consistency of supervision could not be achieved unless

sergeants are added for the full 4th watch. When the SJPD added the limited 4th watch, it determined that one sergeant could supervise two teams.[7] Accordingly, the SJPD added four sergeants to supervise the eight 4th watch teams.[8] The SJPD's March 1999 4th watch team sizes range from 2-4 officers per team. Teams are combined such that sergeants on the 4th watch supervise 5-6 officers.

The City Auditor's Version 1 full 4th watch also has relatively small teams, 3-5 officers per team. As such, using one sergeant to supervise two teams for a full 4th watch seems feasible. Under this scenario the SJPD would need to add 12 sergeants to the new teams for a full 4th watch at an estimated cost of $1.3 million per year. Our analysis shows that in using the Version 1 model, on Watch 4 one sergeant can supervise 6 – 9 officers. This allocation is consistent with the SJPD's practice of assigning one sergeant for 4 – 9 officers.[9]

Exhibit 4 compares the SJPD's limited 4th watch and the City Auditor's Version 1 full 4th watch span of control.

[7] Under the redistricting project implemented in March 1999, with the expansion from 12 districts to 16 districts, the sergeant deployment shows that two teams share the same sergeant in 10 of the 16 districts on the third watch.

[8] Only half of the sixteen districts have the 4th watch on Thursday – Sunday.

[9] The sergeants and the officers on the combined teams are on the same radio channel. The sergeants and the officers on the combined teams do not always have the same days on and days off, however, they are very similar. Since the officers receive supervision from another sergeant on the overlap day anyway, we estimate the difference would have a small effect on team integrity. Further, the model can be re-run such that the combined teams can have the same days on and days off.

Exhibit 4 Comparison Of The SJPD's And The City Auditor's Version 1 - 4th Watch Span Of Control

Span of Control Factors	SJPD's Current Limited 4th Watch	City Auditor's Version 1 - Full 4th Watch	Difference
Number of days of the week patrolled	4	7 *	3
Number of districts served	8	16	8
Number of patrol teams	8 **	32 ***	24
Number of Sergeants	4	16	12
Ratio of Sergeants to patrol teams	1 to 2	1 to 2	None
Ratio of Sergeants to patrol officers	1 to (5-6)	1 to (6-9)	

* Two 4-day work weeks, with one day being the overlap day which officers use to cover absences in other districts

** One team per district for 8 districts

*** Two teams per district for 16 districts

Additional Patrol Vehicles Could Be Needed To Implement The City Auditor's Staffing Models

Our vehicle analysis indicates that the City Auditor's staffing model Version 1 with a full 4th watch would require more vehicles than the SJPD's current deployment. Specifically, our analysis indicates that Version 1 could require approximately 33 more vehicles. The City Auditor's Version 1 requires more vehicles because it has seven more staff than the SJPD's model and the full 4th watch with the modified starting times requires three separate sets[10] of vehicles. By way of contrast, the SJPD's current deployment only requires two sets of vehicles and an additional 22 vehicles for the limited 4th watch.

Currently, the cost of an additional vehicle is estimated to be approximately $43,800. Thus, the cost of 33 additional vehicles needed to implement Version 1 with a full 4th watch would be approximately $1.4 million. Our analysis did not address the maintenance costs associated with the additional vehicles.

Our estimate of 33 additional vehicles for a 4th watch assumes that the SJPD would need to revise its vehicle rotation practice. Currently, the 1st and 3rd watches share a set of vehicles and the

[10] A set is a group of vehicles used by patrol officers on one or more watches.

2nd and 4th watches have their own set of vehicles. This vehicle rotation practice would not be practical under Version 1 because all four watches would each need their own set of vehicles.

A revised vehicle rotation practice could significantly reduce the number of vehicles required, but additional vehicles would still be needed. To implement Version 1 with fewer cars, the SJPD could change its vehicle rotation practice so that the 1st, 2nd, and 3rd watches alternate the use of two sets of vehicles. The 4th Watch would need its own set of vehicles. Our analysis indicates that Version 1 would require 33 more vehicles under this vehicle rotation practice.

Although Version 1 requires more patrol vehicles, further analysis shows that a variation in deployment similar to the early car deployment the SJPD currently uses would allow the SJPD to implement a full 4th watch without any additional vehicles. Specifically, the SJPD could use 16 early cars that start ½ hour earlier than Watch 1, and use 16 late cars that start ½ hour later than Watch 2. By using early and late cars, the number of cars required on each of the watches is reduced by 16. This is because the 16 cars the early Watch 1 uses can also be used during Watch 2, and the 16 cars the late Watch 2 uses can be shared with Watch 1. The SJPD stated that they are concerned with increased staff and training time associated with the late car briefing.

The City Auditor's Model, Version 2 Uses An Alternative Basis For Calculating Free Patrol Time

The City Auditor's Version 2 model uses an alternative basis for calculating free patrol time from that used by the SJPD's revised model and the City Auditor's Version 1 model. Specifically, the SJPD's revised computer model applies the 40 percent requirement for free patrol time to the total available patrol time. The total available patrol time includes not only time for responding to CFS, but also court and training time, and status activity time[11], which includes activities such as follow-up, administrative duties, lunch, breaks, travel time, and report writing. We used the SJPD's basis for calculating the 40 percent requirement for free patrol time in the City Auditor's

[11] Status activity is a police management report category that reports on the amount of time officers spend on loading and fueling patrol cars, lunch, breaks, some report writing, follow-up, and some time for return to the station at the end of the shift. Officers radio the start and end time spent on these activities to the Communications Center where they are recorded by the computer-aided dispatch system. Officers can also key the information into their laptop computers that are connected to the Computer Aided Dispatch (CAD) system.

Version 1 model in order to isolate the effect of the full 4th watch and different starting times.[12]

With respect to the level of free patrol time, we were unable to identify an authoritative standard regarding the appropriate level of free patrol time that should be available and the method for calculating it. Therefore, we were unable to validate whether the amount of free patrol time that the SJPD builds into its staffing calculations is appropriate. However, in our opinion, the method that the SJPD used to calculate its free patrol time requirement is questionable and should be justified because of the significant impact the calculation has on its staffing requirement.

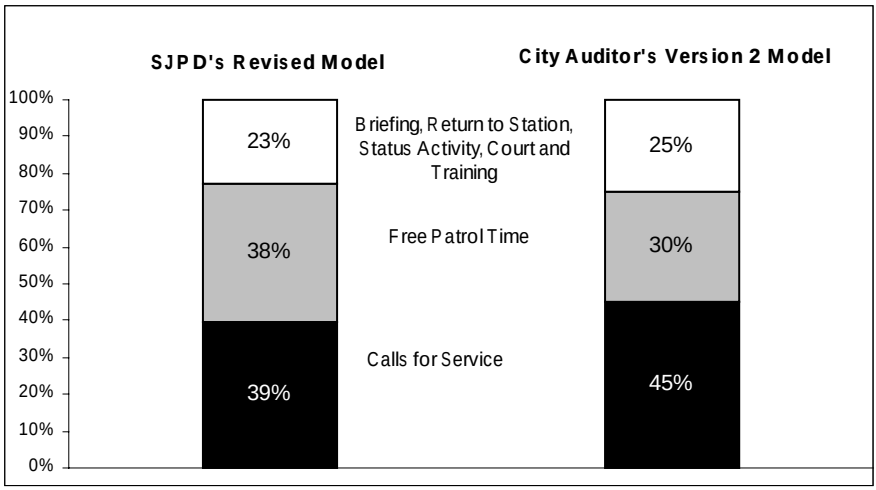
Specifically, our analysis brings into question the SJPD'S calculation of free patrol time. Essentially, the SJPD's handling of status activity results in its patrol staff computer model adding free patrol time to time that is already not available for CFS and free patrol time. For instance, when the SJPD's model calculates free patrol time on the total 10-hour day less 30 minutes for briefing time (9½ hours), it is calculating free patrol time against activities such as follow-up, administrative, lunch, breaks, return to station, and training. To illustrate, the SJPD's model includes approximately 105 minutes for the above-mentioned items. When the SJPD's patrol staff computer model calculates the free patrol time on 9½ hours, about 42 minutes (105 minutes X 40 percent) of its free patrol time per patrol officer per day is calculated on time that is not available for CFS and free patrol time.

In our opinion, the SJPD should have subtracted the status activity, court, and training time before calculating free patrol time. This approach provides for 40 percent free patrol time on the actual patrol time. Using this method, we calculated the free patrol time to be approximately 180 minutes per day as compared to the 228 minutes in the SJPD's model.

Graph 9 compares the components of a patrol unit's daily workload in the SJPD's revised model with the daily workload components in the City Auditor's Version 2 model.

[12] Because both the City Auditor's models are run on a 9-hour day, Version 1 cannot include return to station time in its basis for calculating free patrol time. The SJPD's model is also run on a 9-hour day, however its free patrol time and its ideal CFS workload (discussed on page C-2) are based on a 9½-hour day.

Graph 9 SJPD's Revised Model Compared To The City Auditor's Version 2 Model - Time Components Of A Patrol Officer's Ten-Hour Work Day



As the above graph demonstrates, the SJPD's patrol staffing computer model and the City Auditor's Version 2 model have different percentages for each of the different workload components. In comparing the two, the SJPD's model has more free patrol time available. On the other hand, the City Auditor's Version 2 model has more time for CFS and for briefings, return to station, status activity, court time, and training. It should be noted that both the SJPD's and City Auditor's models have more actual free patrol time than is shown in the graph above. This is because both the SJPD and the City Auditor added staff to the model-calculated staff requirement because of rounding. Specifically, if the models indicated a need for 4.01 officers on a particular team, both the SJPD and the City Auditor rounded up to 5 officers. This rounding technique effectively created additional free patrol time. As a result, in the City Auditor's model Version 2, the actual free patrol time is 37 percent, instead of the 30 percent shown above in Graph 9. The SJPD's 38 percent free patrol time shown above in Graph 9 would be similarly greater in actuality.

City Auditor's Model Version 2

The primary advantage of Version 2 is that it requires 488 officers, or 58 fewer officers than the SJPD's March 1999 staffing plan. Thus, by using the City Auditor's basis for calculating free patrol time, the patrol staffing requirement would be reduced by 58 officers. This equates to $4.8 million in patrol staff. Like Version 1, Version 2 has a full 4th watch,

the same starting times, and appears to equalize the CFS workload among the patrol officers.

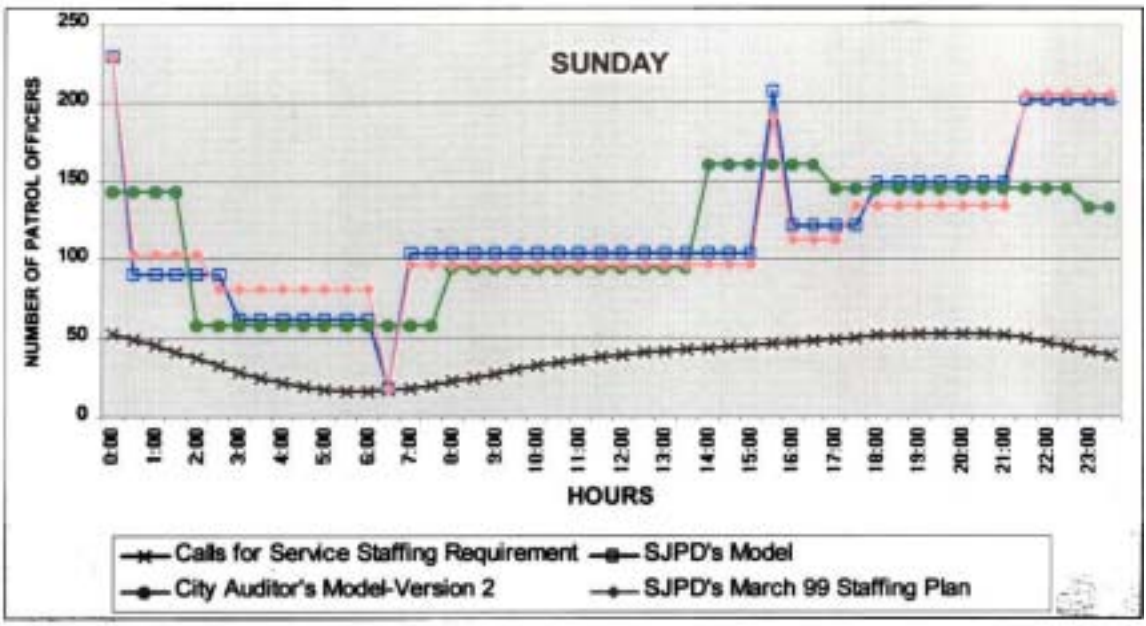
The disadvantages of the City Auditor's Version 2 are that

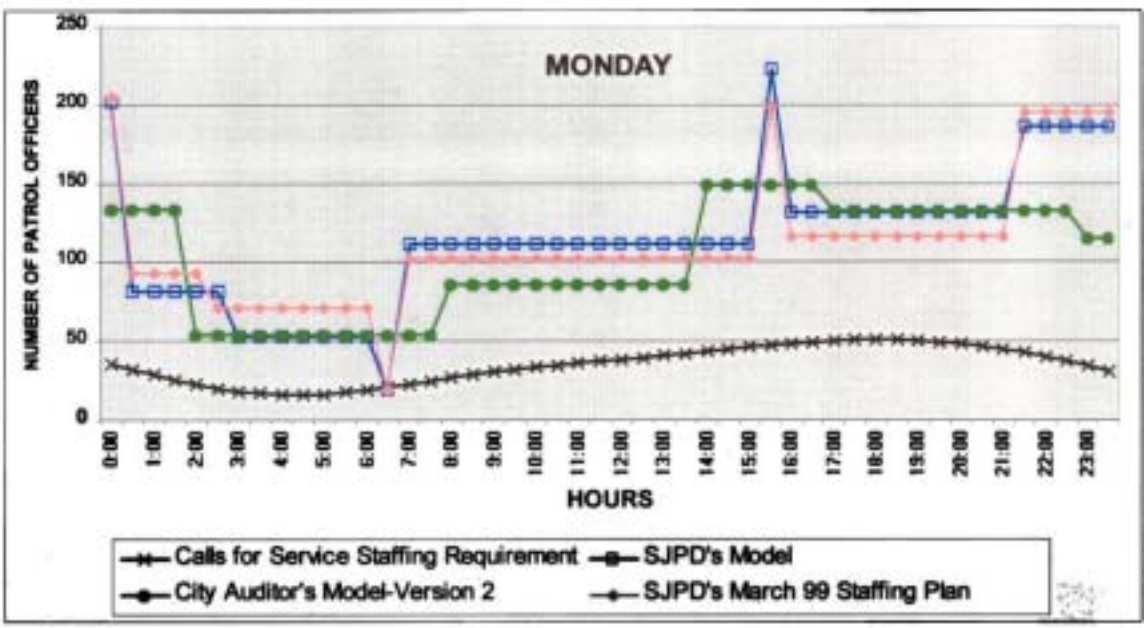
- Some of the starting times specified in the model are not consistent with the MOA, and
- As many as 12 more sergeants may be needed.

Graphs 10 – 16 compare the City Auditor's Version 2 calculated patrol staff requirement model to the SJPD's calculated patrol staff requirement model and March 1999 patrol staffing.

The Graphs help to highlight how the City Auditor's Version 2, with a full 4th watch and different starting times appears to provide a better matching of staff to workload than the SJPD's calculated patrol staff requirement and the SJPD's March 1999 deployment. The City Auditor's Version 2 model fully covers all workload, free patrol time, and absence requirements.

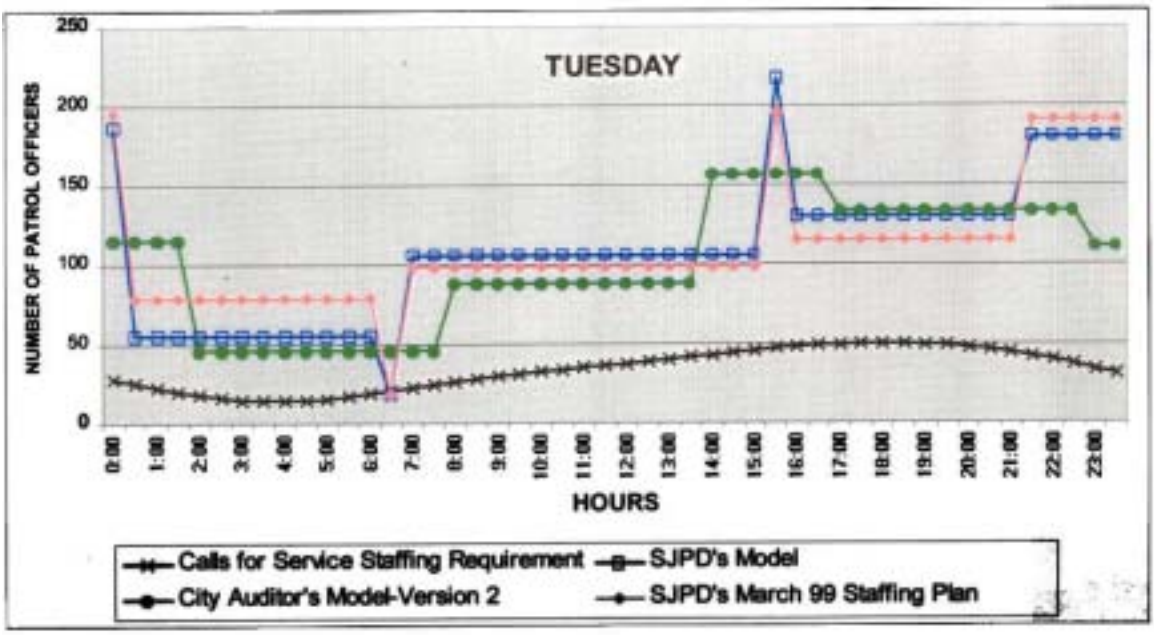
GRAPHS 10 AND 11
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 2 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN

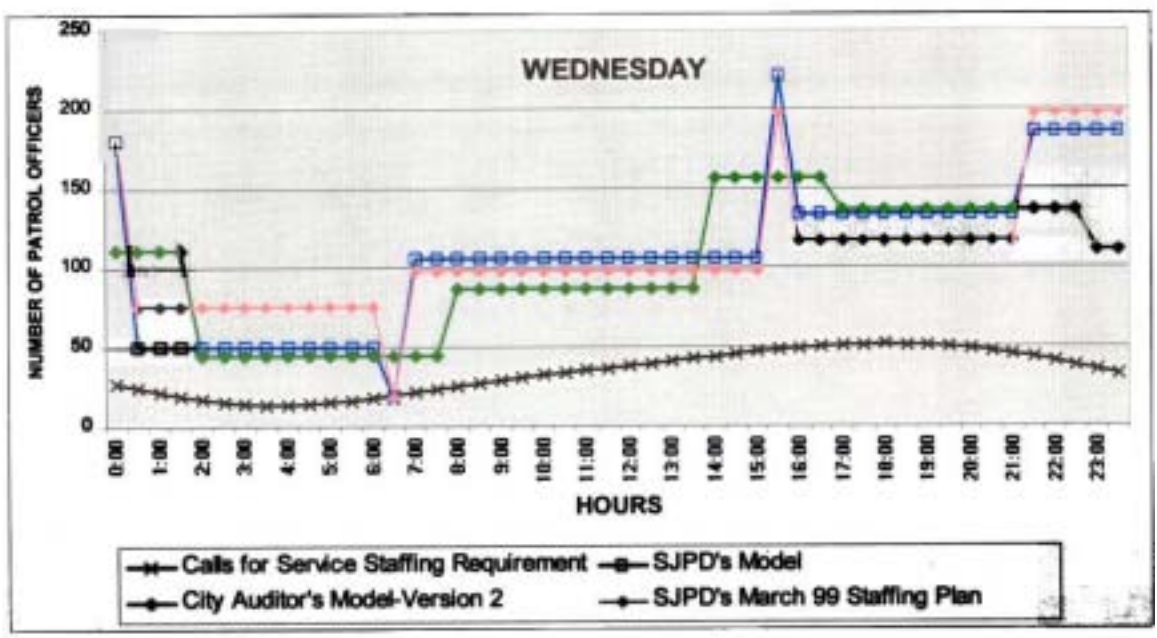




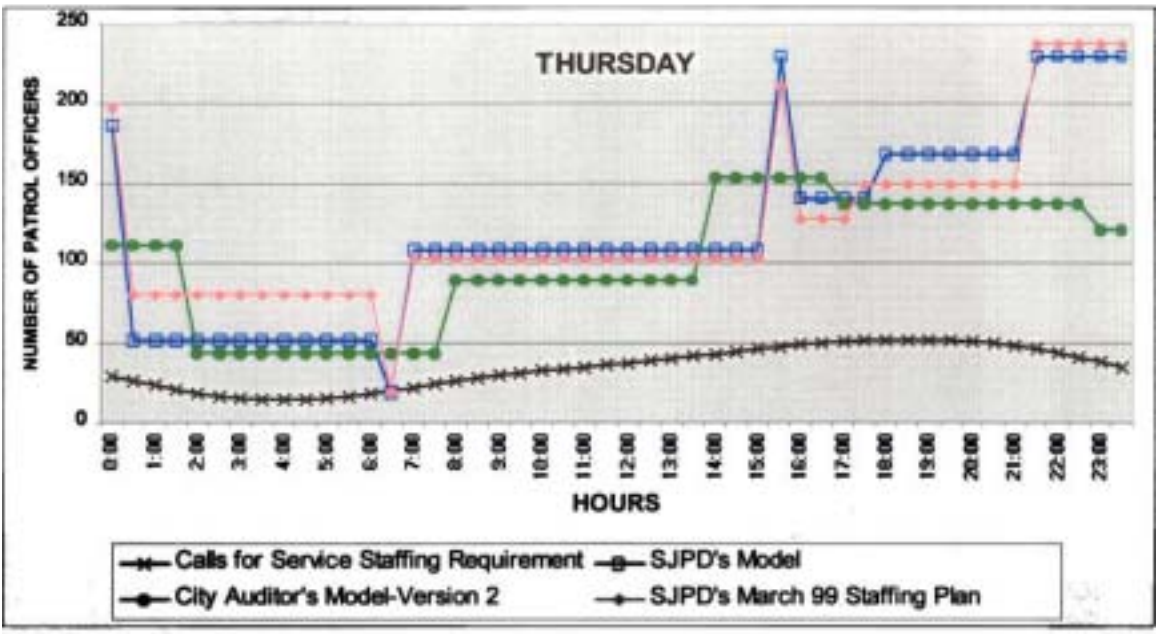
The calls for service staffing requirement is the number of officers required to handle the calls for service workload based on the average call duration of 36.03 minutes. The calls for service data is based on historical 1996 information and has been adjusted for priority levels. Each priority 1 call requires 5.16 officers, priority 2 requires 2.38 officers, priority 3 requires 1.77 officers, and priority 4 requires 1.33 officers. On average each call requires 2.18 officers.

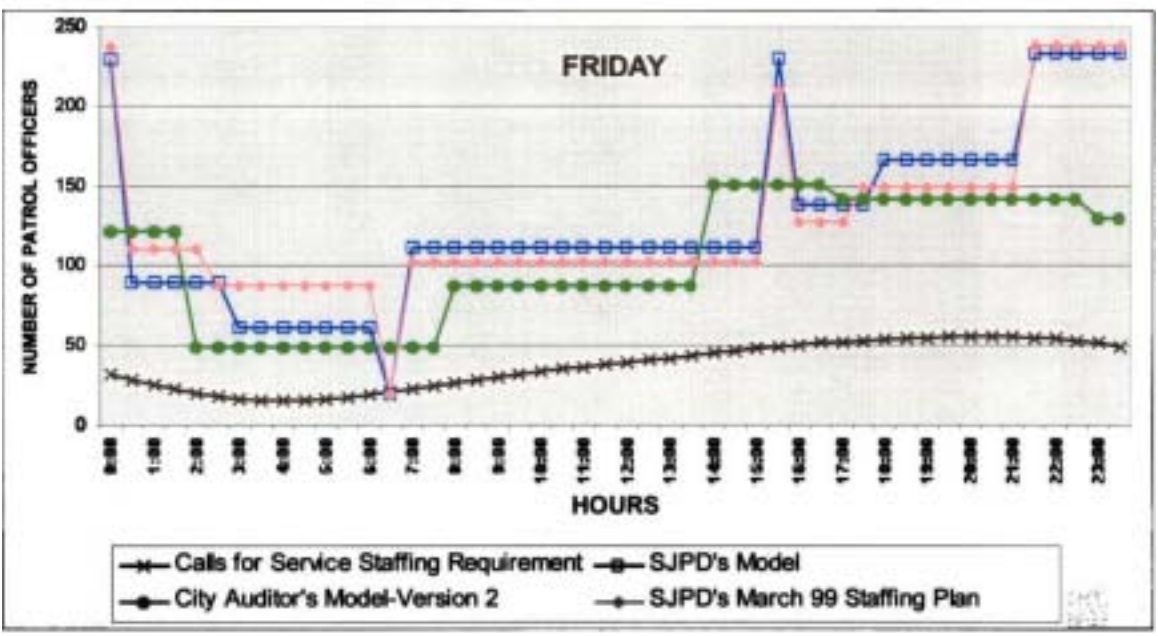
GRAPHS 12 AND 13
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 2 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)



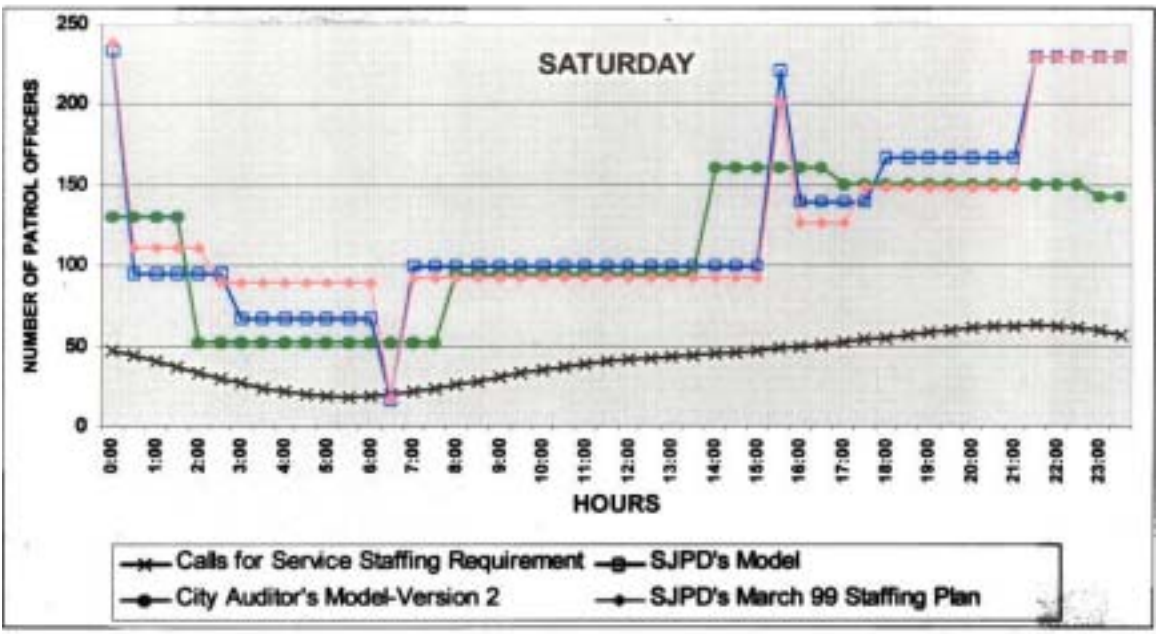


GRAPHS 14 AND 15
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 2 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)





GRAPH 16
CITY-WIDE COMPARISON OF CITY AUDITOR'S STAFFING MODEL VERSION 2 TO THE SJPD'S STAFFING MODEL AND MARCH 1999 STAFFING PLAN (cont.)



In our opinion, the Graphs highlight several SJPD deployment issues that merit further attention and should be more fully evaluated. As the graphs show, the SJPD's two deployment plans have staffing peaks from 9:30 P.M. to 12:30 A.M. *(21:30 hours to 00:30 hours)* every day of the week. With the exception of Fridays and Saturdays, these staffing peaks coincide with a drop in the CFS workload.

Similar to Version 1, the City Auditor's model, Version 2, uses four full watches and different starting times to deploy staff. The staffing for the full 4th watch is derived by redeploying officers from the other watches. As Exhibit 5 shows, the SJPD's 2nd and 3rd watches provide the officers to staff Version 2's 4th watch. See pages D-2 and D-3 in Appendix D for staffing information for Version 2 and the SJPD March 1999 staffing plan by district, watch, and day of the week.

Exhibit 5 Comparison Of Total Number Of Officers Per Watch: SJPD's March 1999 Staffing Plan To Version 2

Daily Average Officers Per Watch	Watch 1	Watch 2	Watch 3	Watch 4	Total Watches
SJPD March 1999 Staffing Plan	173	210	141	22	546
City Auditor's Version 2	157	129	87	115	488
Increase/<Decrease>	16	<81>	<54>	93	<58>
% Change Inc/<Dec>	<9%>	<39%>	<38%>	423%	<11%>

We also performed a chi-square and an *r* square analysis as described on page 20. The results for Version 2 are as follows:

Exhibit 6 Comparison Of SJPD's And City Auditor's Version 2 Models' Statistical Measurements

Statistical Measurement	SJPD's Model	City Auditor's Version 2
Chi-square[13]	.09	.04
R square[14]	.52	.76

As shown above, both statistical measurements indicate that the City Auditor's Version 2 appears to provide a better matching of staff to workload than does the SJPD's model. Specifically,

[13] With the chi-square measurement, the lower the score, the better.

[14] With the *r* square measurement, the closer to 1, the better.

Version 2's chi-square measurement of .04 is much lower than the SJPD's score of .09. Similarly, the City Auditor's Version 2 *r* square score of .76 is 50 percent closer to 1 than the SJPD's score of .52.

Additional Sergeants Could Be Needed

Because Version 2, like Version 1, also has a full 4th watch, additional sergeants could be needed as described on pages 22 and 23. However, as we noted previously, the City Auditor's Version 2 requires 58 fewer officers than the SJPD currently allocates to patrol. Some of these positions could be used to create more sergeant positions. Further, because Version 2 requires fewer officers, the span of control citywide would be significantly improved because the teams would be much smaller as shown in Exhibit 7.

Exhibit 7 compares the SJPD's March 1999 staffing plan to the City Auditor's Version 2 ratio of sergeants to patrol officers.

Exhibit 7 Comparison Of The SJPD's March 1999 Staffing Plan To The City Auditor's Version 2 Ratio Of Sergeants To Patrol Officers

Staffing Plan Or Model	Number Of Sergeants	Number Of Patrol Officers	Average Ratio Of Sergeants To Patrol Officers
March 1999[15]	90	546	1 to 6.1
Version 2	102	488 – 546	1 to 4.8 – 1 to 5.4

We have also included detailed team information in Appendix D for Version 2 and the SJPD's March 1999 staffing plan.

Additional Patrol Vehicles Would Not Be Needed To Implement The City Auditor's Version 2 Staffing Model

Our vehicle analysis indicates that the City Auditor's staffing model Version 2 with a full 4th watch would not require more vehicles.

[15] The March 1999 deployment shows 90 sergeants supervising 546 officers for a ratio of 1:6.1. The SJPD would need a total of 100 sergeants to eliminate the current practice of two teams sharing the same sergeant in 10 of the 16 districts on the 3rd watch.

City Auditor Conclusions Regarding Opportunities To Improve The Efficiency Of Patrol Staffing

The City Auditor's Office prepared computerized staffing and deployment models to identify opportunities to improve the efficiency of patrol staffing and deployment. While our computerized staffing and deployment models appear to identify patrol deployment alternatives that are empirically more efficient than the SJPD's current deployment that may not, in fact, be the case. This conclusion is based on data limitations and the potentially high costs of alternative methods, and public and officer safety concerns.

In our opinion, our computerized models help to identify several deployment issues that merit further attention and should be evaluated more fully. For instance, the graphs of both of the City Auditor's models highlight some of the benefits of an early afternoon 4th watch and different watch starting times. Specifically, the early afternoon 4th watch seems to provide a better matching of staff to workload, thereby equalizing the CFS workload. The early afternoon 4th watch may also benefit the SJPD's community policing efforts because more officers would be available during the prime community policing hours.

As noted in the report, the audit also identified a number of additional costs associated with a full afternoon 4th watch. The additional costs are for more officers, more vehicles, and more cars. These costs need to be considered in evaluating the merits of a full 4th watch or any other deployment plan.

Besides economic costs, the SJPD noted several public and officer safety concerns that need to be considered. These concerns include the number of officers available to respond to calls in the early morning hours and officer fatigue.

As to the level of free patrol time, we were unable to identify an authoritative standard regarding the appropriate level of free patrol time that should be available. We used one method to calculate the amount of free patrol time needed and the SJPD used another method. In our opinion, our method provides a reasonable level of free patrol time. On the other hand, the SJPD staff believe that their method of calculating free patrol time is also appropriate. Nevertheless, the decision on which method to use has a significant effect on the number of patrol officers needed and should be justified.

To demonstrate the cost implications of the basis for calculating free patrol time we compared the City Auditor's Version 2

calculated patrol staffing to the SJPD's budgeted staffing deployment. Version 2 requires 58 fewer officers than the SJPD's budgeted staffing deployment which equates to about $4.8 million worth of patrol staffing per year. Version 2 requires fewer officers because it calculates free patrol time based on patrol time without status activity, court, and training time. However, Version 2 with the full 4th watch requires 12 additional sergeants, which would add about $1.3 million in patrol staff costs per year. Thus, we estimate the cost implication of the basis for calculating free patrol time at about $3.6 million. The $3.6 million should not be interpreted to mean that the City Auditor is recommending a reduction in the number of patrol officers. Instead, these savings should be viewed as an opportunity to reallocate and redeploy staff to address issues such as community policing, public and officer safety, and other needed policing activities. The calculation of the $3.6 million is shown below.

58 fewer officers at $83,000 per officer per year	$4,814,000
12 additional sergeants at $105,000 per sergeant per year	<1,260,000>
Annual cost implications of the basis for calculating free patrol time	$3,554,000

In our opinion, because the level of free patrol time has such a significant effect on patrol staffing needs, the SJPD should prepare a staffing proposal that describes the advantages, disadvantages, and cost implications of the appropriate basis for calculating free patrol time.

Also, in our opinion, the SJPD's staffing proposal should be presented in the context of a formal community policing plan. Currently, the SJPD does not have a formal community policing plan. A November 1998 police management study of the SJPD noted that a written community policing plan is needed to establish clear community policing objectives.

Specifically, the police management study of the SJPD noted the following regarding the SJPD's community policing efforts:

> *Currently there is not an organization-wide accepted definition of community policing within the City of San Jose. Without a definition, the steering of such activities and initiatives is set on no clear course . . .*

> *Organizational supportive materials such as The Years Ahead, 1996-1997—2000-2001 Study, Annual Program Plans, and Management Reports still refer to community policing activities in terms of programs and projects. Due to the success of many of these programs San Jose has been recognized as a national success in community policing practices. However, there remains the need for a strategic, multi-year, community policing based plan . . . To move to the next level benchmark in community policing, the SJPD should undertake a formal planning process for community policing that culminates in a written plan extending out three to five years . . . In addition, formalized planning is likely to produce more and better quality information on which decision-makers can rely.*

These concepts should be incorporated in a strategic, multi-year, community policing-based plan and a staffing proposal for the SJPD's BFO Division. The SJPD and the City Administration should develop and forward such a proposal to the City Council for concurrence. By so doing, the SJPD could reallocate and redeploy as much as $3.6 million per year in BFO patrol staff resources to activities such as community policing, patrol staff safety, and other areas of need in San Jose.

We recommend that the SJPD and City Administration:

Recommendation #2

Use the information in this report to develop, and forward to the City Council for concurrence, a strategic, multi-year, community policing-based plan and a staffing proposal for the SJPD Bureau of Field Operations patrol division that is responsive to both officer and public safety needs and calls for service demand. The report should include the advantages, disadvantages, and cost implications of the following policy decisions:

- **A full 4th watch, and**
- **An appropriate basis for calculating free patrol time.**

The SJPD And City Auditor Staffing Model Limitations

Both the City Auditor's models and the SJPD's model have significant limitations that need to be considered when discussing the various deployment alternatives. The most significant limitation with the models is that they are only forecasting tools driven primarily by quantitative data. The

best overall deployment plan should be one that balances efficiency with practical considerations such as public and officer safety. Therefore, the models should be viewed as a tool for achieving the best overall deployment plan, not the definitive deployment plan. For instance, both the SJPD's model and the City Auditor's models rely on average lengths of time for all CFS instead of the average time spent on CFS by type of call. That is, all of the models assume that a set number of vehicles responded to each type of priority call and each responding unit spent 36.03 minutes, regardless of the nature of the call or the time of day or week. For instance, if certain types of CFS or CFS received at certain times of the day or night generally took longer to resolve, the models would not differentiate these calls from any other. Finally, none of the models consider response time performance targets or if CFS are backed up (queuing).

Other limitations and concerns regarding the model are described below.

Calculation Of The Calls For Service Workload

One aspect of our model that differs from the SJPD's model is the calculation of the CFS workload. To determine the CFS workload, the SJPD used each district's average CFS, weighted by priority, by the half-hour, for each day of the week. In contrast, the City Auditor's models "smoothed" the CFS workload. Specifically, the City Auditor's models smoothed the CFS workload by averaging each half-hour of data with the preceding and subsequent two hour time period. The benefit of "smoothing", a common forecasting technique, is that the minor peaks and valleys in the workload are rounded, allowing for improved forecasting.

Our smoothing of the workload concerned the SJPD because their model included a constraint that the staffing level had to at least equal the peak workload for every half-hour time period. We analyzed the workload data to determine if the City Auditor's Office models met the SJPD's constraint. We found that of 5,376 half-hour segments in our model (336 half-hours in a week x 16 districts), there were only 4 instances when our Version 1 did not meet the peak workload and only 15 instances when our Version 2 did not meet the peak workload. We also determined that we would need to add 4 staff to Version 1 and 11 staff to Version 2 to meet the peak workload every half-hour.

Staffing Levels On Watch 3 May Be Too Low

The SJPD is concerned that the City Auditor's models provide too few patrol officers from 2:00 A.M. to 8:00 A.M. The SJPD's model also produced a low staffing level from 12:30 A.M to 7:00 A.M. on Tuesday, Wednesday, and Thursday mornings and from 2:30 A.M. to 7:00 A.M. on Friday, Saturday, Sunday, and Monday mornings. This is because of the low level of CFS during these time periods. The SJPD decided to increase the number of patrol officers for the March 1999 staffing plan during these early morning time periods to accommodate officer and public safety. In reviewing the City Auditor's models, the SJPD also noted that several 3rd watch teams had only two officers. According to the SJPD two officer teams are unacceptable for public and officer safety. Finally, the SJPD noted that during the day special SJPD units are available as back-up to patrol units. However, during the early morning hours there are no special units working that would be available for back-up. This limitation in the model can be addressed by factoring minimum staffing levels into the model.

Complexity Of City Auditor's Models

Because of the complexity of the City Auditor's models, even the slightest change in assumptions resulted in months of intense manual inputting and recalculations. In addition, every changed assumption had to be run 16 times because each model is comprised of 16 sub-models representing each of the City's 16 districts' distinct CFS workloads. As a result, we were unable to run models for other potentially viable patrol staff deployment methods because of time constraints. For example, the City of Sacramento, California, uses a patrol deployment method similar to the SJPD's, but which allows for a more efficient deployment of resources. Specifically, Sacramento uses a 4-10 workweek, but reduces the size of the overlap team day by having some officers start a day earlier than the other members of their team. This results in two overlap days, with the staffing on each of the two overlap days smaller than if there was one overlap day.

The City of Sacramento increases its patrol team sizes to cover for all absences. Because the overlap day is small, the officers are still responsible for CFS on the overlap days, however, this method does allow officers to remain in their districts on overlap days. In our opinion, by having the teams start their workweeks on different days, Sacramento is able to reduce the inefficiencies seen in the SJPD's patrol deployment.

The City of San Diego, California, uses another deployment method. San Diego also uses a 4-10 workweek, however, like the City of Sacramento, it also provides increased team sizes to cover absences. San Diego's deployment practice is different in that the overlap days are dedicated to community policing and training.

Other Jurisdictions Use Police Staffing And Deployment Software

In the past, the SJPD did not use specialized police staffing and deployment software because it was not compatible with some of the City's patrol staffing practices such as team integrity and the 4-10 workweek. However, with advances in software and technology, specialized software is now available that is compatible with the City's patrol staffing practices. In addition, the specialized software has more flexibility and capabilities than either the SJPD's or the City Auditor's. For example, the specialized software can extract the data from the CAD, use the data by type of call, and does not rely on length of CFS averages. Also, the specialized software can perform queuing to determine when CFS tend to stack up.

As part of our audit, we contacted other police departments and found that many are currently using different types of police staffing and deployment software. Cities and counties using this type of software include: Sacramento, California; Fresno, California; Richmond, California; Seattle, Washington; Dallas, Texas; Nashville, Tennessee; and Los Angeles County, California.

Patrol staffing software can provide a number of benefits. For instance, one benefit is the capability of identifying inefficiencies in patrol staffing deployment. A Nashville, Tennessee police captain told us that the software they used allowed them to identify 47 officers that could be redeployed to other activities. These police staffing software also allow law enforcement agencies to consider response times and queuing problems. For instance, the Nashville, Tennessee police captain also told us that these software aided them in eliminating stacked calls in the afternoon hours by redeploying patrol officers where they were needed most.

Another benefit of some patrol staffing software is that it can also provide crime trend and pattern recognition to facilitate district or beat problem solving. Such information is critical for effective community policing and problem solving. However, the SJPD does not have this information readily available at the

beat or district level. Although the new Automated Information System (AIS) could provide this information, the information would not be as readily available.

The 1998 police management study, in fact, noted that the SJPD needs to improve its information management. According to the management study,

> *One of the most important tools that a modern, high-performing organization can have is a system that provides timely and comprehensive information for decision making . . . One of the critical tools for effective community policing and problem solving is current information about crime and disorder problems disaggregated to the district and beat levels. As a department's patrol section takes steps to implement community policing and problem solving, it will need information that will allow frequent and small-scale problem identification, foster repeat call analysis, and provide data to assess the results of problem solving efforts.*
>
> *The benefits of this approach are many. Enhanced analytical products improve patrol productivity, because officers' activities are directed toward specific objectives. For example, analyzing repeat calls for service and seeking to eliminate or ameliorate the problems that create frequent calls to a given location free patrol resources and decrease calls for service. This targeting means that the patrol force will be able to work more efficiently and effectively within resource limits.*

Finally, another local jurisdiction we surveyed noted the following benefits in their grant application requesting funds for deployment and crime analysis software:

- Can identify locations of repeat calls through a geographic location system, thus allowing the department to target location of repeat calls and identifying the cause of these repeat calls. Addressing repeat calls reduces repetitive call answering. Repetitive call loads "eat up" patrol officers' time. Reducing or removing them allows officers more time for more proactive work;

- Helps the department prioritize the most significant problems and allocate appropriate resources;
- Allows the department to set priority levels for 81 problem categories by geographic area or default to agency standards. The problem category priority by geographic area is integrated with the software's automatic trend analysis and pattern recognition tools;
- Helps the department allocate and target resources to match the needs of the problem-solving efforts; and
- Has the ability to optimally target resources to meet their call load and thus increase efficiency and effectiveness. Also, it allows the department to free officers from call load to spend time on community problem solving.

Federal Or State Funds Could Be Used To Buy Software

Although a firm price for the police staffing and deployment software cannot be determined, one vendor that has implemented systems with two of the jurisdictions we contacted estimated the cost for implementing a system in San Jose would be approximately $350,000 - $400,000. Although costly, we found that a number of the jurisdictions have used federal or state grant funds to purchase this system. Furthermore, the acquisition cost is essentially a one-time expense. Moreover, the vendor discussed above provides a free cost/benefit analysis for the software system.

One of the Federal grants available is the COPS MORE (Making Officer Redeployment Effective) grant. The Department of Justice fact sheet regarding the COPS MORE grant states:

> *The most important requirement in the COPS MORE application was a demonstration of how COPS MORE funds would result in actual increases in the number of officers deployed in community policing equal to, or greater than, the number of officers which would result from grants of the same amount for hiring new officers.*

According to staff in Sacramento, California and Nashville, Tennessee, these cities obtained federal funds to purchase or upgrade their patrol staffing and deployment software because it allowed them to identify inefficiencies in their current staffing. Thus, the staffing software allowed them to essentially meet their patrol workload with fewer patrol

officers. By doing so, staff in Nashville, Tennessee reported that they were able to deploy patrol staff to other activities such as community and proactive policing. As noted previously, staff in Nashville, Tennessee reported that their patrol staffing and deployment software allowed them to redeploy 47 officers and virtually eliminate the backing up of calls during busy times of the day.

According to the United States Department of Justice, COPS MORE grant funds have been awarded in 1995, 1996, and 1998, but were not awarded in 1999. In addition, the availability of future funding is not known at this time.

Our review found that if COPS MORE funds are not available, other federal and state funds could be used to purchase this software. Other options include the Federal Local Law Enforcement Block Grants (LLEBG) and the State of California Supplemental Law Enforcement Services (SLES) grant. According to the City's liaison in Washington, D.C., the LLEBG grant will be available in 2000. This grant award is based on a jurisdiction's number of Uniform Crime Reports Part 1 Violent Crimes reported to the Federal Bureau of Investigations. Further, the grant program guidelines specify that funds must be spent in accordance with one or more of seven purpose areas including

> *Law enforcement support for . . . Procuring equipment, technology, and other materials directly related to basic law enforcement functions.*

According to U.S. Department of Justice staff in Washington, D.C., procurement of police staffing and deployment software would meet these criteria.

The SJPD has already received Council approval for its 1999-00 SLES grant. According to the SJPD, 2000-01 grant funds are anticipated to be available. The SLES grant is for "front line law enforcement purposes." The SJPD has used SLES for computer systems with front line law enforcement purposes.

If federal or state grant funds are not available, we recommend that the SJPD, through the annual budget process, develop a budget proposal to purchase the software.

We recommend that the SJPD:

Recommendation #3

Investigate the feasibility of using federal or state grant funds to procure police staffing and deployment software. If federal or state grant funds are not available, we recommend that the SJPD, through the annual budget process, develop a budget proposal to purchase the software.

CONCLUSION

The SJPD and the City Auditor's Office developed computerized staffing models in order to determine the number of patrol officers required for redistricting. The SJPD's model was constrained by a number of scheduling and deployment practices that are covered under the current MOA between the City of San Jose and the San Jose Police Officers' Association. The City Auditor's Office was not constrained by the MOA and was able to develop models that met the CFS workload and improved the matching of patrol staffing to workload. While the City Auditor's computerized models appear to identify patrol deployment alternatives that are empirically more efficient than the SJPD's current deployment, that may not, in fact, be the case. This conclusion is based upon data limitation, the potentially high cost of alternative deployment methods, and officer and public safety. However, the City Auditor's analysis identified several deployment issues that merit further study. These issues include a full afternoon 4th watch and different starting times. In addition, the City Auditor's Office questions the method the SJPD uses to calculate free patrol time. Specifically, calculating free patrol time based upon total available patrol time less patrol officer activities such as follow-up, administrative, lunch, breaks, court, and training time, reduces staffing requirements by 58 positions. As a result, the SJPD could use these patrol resources for community policing, public and officer safety concerns, or other policing activities.

Although both the City Auditor's Office and the SJPD developed patrol staffing and deployment models, we found that other police departments have purchased specialized patrol staffing model software that have more capability and flexibility. Although costing as much as $400,000, the benefits of these software packages clearly appear to outweigh the costs. A number of police jurisdictions have used federal grant funds to procure these software packages. In addition, the SJPD may also have access to state grant funds to procure these software packages.

RECOMMENDATIONS

We recommend that the SJPD and City Administration:

Recommendation #1 **Negotiate with the San Jose Police Officers' Association to modify shift-starting times to provide sufficient flexibility to deploy officers in the most efficient and effective manner. (Priority 2)**

Recommendation #2 **Use the information in this report to develop, and forward to the City Council for concurrence, a strategic, multi-year, community policing-based plan and a staffing proposal for the SJPD Bureau of Field Operations patrol division that is responsive to both officer and public safety needs and calls for service demand. The report should include the advantages, disadvantages, and cost implications of the following policy decisions:**

- **A full 4th watch, and**
- **An appropriate basis for calculating free patrol time.**

(Priority 2)

We recommend that the SJPD:

Recommendation #3 **Investigate the feasibility of using federal or state grant funds to procure police staffing and deployment software. If federal or state grant funds are not available, we recommend that the SJPD, through the annual budget process, develop a budget proposal to purchase the software. (Priority 2)**